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EXAMINER	
FERRIS III, FRED O	

ART UNIT	PAPER NUMBER
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/746,014	Applicant(s) GOLDMAN ET AL.	
	Examiner Fred Ferris	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6, 10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-33 have been presented for examination based on applicant's preliminary amendment filed on 30 August 2003. Claims 1-33 have been rejected by the examiner.

Drawings

2. The drawings filed 11 May 2001 have been reviewed and approved by the examiner pending review by the draftsperson.

Specification

3. The disclosure is objected to because of the following informalities: Specifically, the acronym DOE is not defined in the specification. The specification should be amended to include "Design of Experiments (DOE)" on page 1, line 11.

Appropriate correction is required.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-33 are provisionally rejected under the judicially created doctrine of double patenting over claims 1-26 of copending Application No. 09/689,884. This is a provisional double patenting rejection since the conflicting claims have not yet been patented.

The subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows:

Specifically, claims 1-33 of the present invention are drawn the same limitations as claims 1-26 of Application No. 09/689,884. These limitations include:

- **Automatic process control of input space with boundaries**
- **measurements at selected input space points**
- **input space points to maximize information**
- **predictive input space process model**

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Specifically, independent claim 1 includes limitations relating to a measurement unit, a controller, and a regressor that have not been described in the specification in such a manner as to enable one of ordinary skill in the art to make and/or use the invention. While the specification, for example, makes reference to a "measurable meaning" of the input "measured by the automatic process control (APC) (page 12, line 20), and the input being a type of "controllable" meaning that can not only be "measured" but also "controlled by the APC" (page12, line 22), there are no specifics on the actual operation of either the measurement unit or the controller. No techniques, algorithms, or process steps are given for the operation of either device. The specification further references Figure 5 and mentions that "regression involves the taking the formula model of the model type selected previously and deriving coefficients" (page 16, line 15) but the specific operation of the claimed regressor is not

disclosed. Accordingly, one skilled in the art would not know how to make and/or use the claimed invention without undue experimentation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 15 and 24-33 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,781,430 issued to Tsai.

Regarding claims 1, 3-9, 15 and 24-33: Tsai discloses the elements of the claimed limitations of the present invention as follows:

Independent claim 15 is drawn to:

- Automatic process control using a data model: Tsai discloses an automatic process control using a data model (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. Figs. 4, 8, 9)

- Empirical data extraction and interchange with model: Tsai discloses a model extracting/interchanging empirical data (CL13-L47, CL14-L13)

Independent claim 24 is drawn to:

- Generating model process data by formula: Tsai discloses generating model process data by formula: (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27, Figs. 4, 8, 9-17)

- Controlling the process using process model data: Tsai discloses controlling a process using model data: (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27, CL19-L17-50, Figs. 4, 8, 9-17)

Regarding dependent claims 25-33: This group of claims includes limitations relating to a data generation formula by processing selected input space points (Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27), placing points at boundaries (CL15-L29-CL16-L35), empirical measuring and processing (CL13-L47, CL14-L13), and comparing processed input space data (CL7-L65-CL8-L11) which is taught by Tsai as noted and previously cited above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-14 and 16-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,781,430 issued to Tsai in view of U.S. Patent 6,373,033 issued to de Waard et al.

Independent claim 1 is drawn to:
Automatic process control of input space with boundaries comprising:
process measurements at selected input space points (measurement unit)
selecting input space points to maximize information (controller)
obtaining predictive input space process model from measurements (regressor)

Regarding independent claim 1: Tsai discloses the elements of the claimed limitations of the present invention as previously cited above and as follows:

- Automatic process control of input space with boundaries comprising: (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27, Figs. 4, 8, 9-17)

- process measurements at selected input space points (measurement unit): (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27, CL19-L17-50, Figs. 4, 8, 9-17)

- selecting input space points to maximize information (controller): (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27, CL19-L17-50, Figs. 4, 8, 9-17)

Since neither the claims nor the specification for the claimed invention have disclosed otherwise, and in view of the issues cited under 112(1) rejections above, the examiner is of the opinion that the DOE process as executed by the claimed measurement unit, controller, and regressor are functionally equivalent processes to those executed by the DOE module, RSM module, and PWO module as disclosed by

Tsai in Figures 8 and 9 (also see Objectives I, II, III, Methods I, II, III CL18-L31 to CL19-L14 as noted above).

Tsai does not explicitly teach a predictive modeling process from measurements.

De Waard discloses the elements of the claimed limitations of the present invention as follows:

- obtaining predictive input space process model from measurements (regressor): de Waard discloses a predictive model of a process developed from process measurements. (CL9-L38, CL10-L24-35, CL10-L39, CL15-L19, Figs. 6, 14A-21) de Waard further discloses the use of auto-regression and a measurement controller in model development. (Abstract, Summary of Invention, CL9-L38-65, Figure 5)

It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the teachings of Tsai relating to DOE and automatic process control of input space with boundaries, with the teachings of De Waard relating to developing a predictive modeling process from measurements, to realize the claimed invention. An obvious motivation exists since this area of technology is highly competitive with many types of process modeling techniques and products available in the market place and large amounts of money being spent in product development and improvement. (see D. Boning Introduction/Conclusion, for example) Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place and, hence, would have been motivated to modify the teachings of Tsai with the teachings of de Waard in order to reduce development time and cost.

Regarding dependent claims 2-14 and 16-23: This group of dependent claims includes additional limitations relating to process modeling which are disclosed by the prior art as follows:

- *predictive modeling: de Ward – (Abstract, Summary, CL9-L38, CL10-L24-33, 39, CL15-L19, Figs. 6, 14A-21)*
- *geometric spacing: Tsai - (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27, CL19-L17-50, Figs. 4, 8, 9-17)*
- *boundary points: Tsai - (Summary, Objectives I, II, III, Methods I, II, III See: CL3-L50-CL7-L39, CL13-L36-CL18-L26. CL18-L27, CL19-L17-50, Figs. 4, 8, 9-17)*
- *linear/quadratic formulas: de Ward – (CL10-L49 to CL17-L59, Fig.6)*
- *quality assessment: de Ward – (CL10-L25-33)*
- *lookup tables: An obvious design choice used by one skilled in the art. A lookup table merely a pre-constructed table of values made up of rows and columns to be searched for a desired item of information. (See: Microsoft Press Computer Dictionary, Third Edition, 1997)*

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

"DOE/Opt: A System for Design of Experiments, Response Surface Modeling, and Optimization Using Process of Device Simulation", D. Boning, IEEE Transactions on Semiconductor Manufacturing, Vol. 7, No. 2, May 1994 discloses DOE and automatic process control.

"Design of Experiment is the best way to Optimize a Process at Minimal Cost", S. Kumar, IEEE/CHMT '90 IEMT Symposium, pp 166-173, IEEE 1990 discloses DOE and automatic process control.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 703-305-9670 and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 703-305-3900.

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